

WHAT IS CLAIMED IS:

1. A computer-implemented method for desynchronized fingerprinting of digital data, comprising:
 - 5 selecting embedding regions in the digital data for embedding fingerprints;
 - selecting desynchronization regions in the digital data for desynchronizing copies of the digital data from each other;
 - performing random desynchronization for each of the
 - 10 desynchronization regions to randomly vary a width of each of the desynchronization regions; and
 - embedding fingerprints at each of the embedding regions to produce desynchronized fingerprinted digital data.
- 15 2. The computer-implemented method of claim 1, further comprising randomly selecting the embedding regions and desynchronization regions.
3. The computer-implemented method of claim 1, further comprising using a master key and a hash function to randomly select the embedding
- 20 regions.
4. The computer-implemented method of claim 3, further comprising finding and storing hash values for each of the embedding regions.
- 25 5. The computer-implemented method of claim 1, further comprising using a master key to randomly select the desynchronization regions.
6. The computer-implemented method of claim 1, wherein performing random desynchronization for each of the desynchronization regions further
- 30 comprises using a master key to randomly compute a width for each of the

desynchronization regions such that the width varies between the copies of the digital data.

7. The computer-implemented method of claim 1, further comprising
5 generating multiple copies of the digital data and fingerprinting each copy.

8. The computer-implemented method of claim 1, further comprising
embedding a unique secret key at each of the embedding regions.

10 9. A computer-readable medium having computer-executable
instructions for performing the computer-implemented method recited in claim 1.

10. A computer-readable medium having computer-executable
instructions for desynchronized fingerprinting of digital multimedia data,
15 comprising:
generating multiple copies of the digital multimedia data;
randomly selecting embedding regions within each copy;
randomly selecting desynchronization regions within each copy;
computing a random width for each of the desynchronization
20 regions such that a width of each of the desynchronization regions varies
between the multiple copies; and
embedding information at each of the embedding regions to
produce desynchronized fingerprinted copies of the digital multimedia data.

25 11. The computer-readable medium of claim 10, wherein randomly
selecting embedding regions further comprises using a pseudo-random operator
and a master key.

12. The computer-readable medium of claim 11, wherein the pseudo-
30 random operator is a hash function.

13. The computer-readable medium of claim 10, further comprising finding and storing hash values for each of the embedding regions.

5 14. The computer-readable medium of claim 10, wherein randomly selecting desynchronization regions further comprises using a master key.

10 15. The computer-readable medium of claim 10, wherein computing a random width for each of the desynchronization regions further comprises using a master key for computing a random width and changing the width accordingly.

16. The computer-readable medium of claim 10, wherein embedding information at each of the embedding regions further comprises embedding unique copy information and a unique secret key.

15 17. The computer-readable medium of claim 16, further comprising cataloging the unique copy information such that each of the multiple copies is associated with a specific entity.

20 18. The computer-readable medium of claim 16, further comprising associating the unique copy information with the unique secret key.

19. The computer-readable medium of claim 18, wherein the unique information is number of a specific one of the multiple copies.

25 20. The computer-readable medium of claim 17, further comprising:
extracting the unique copy information from an illegal copy of the digital multimedia data; and
determining from the unique copy information the identities of entities involved in the production of the illegal copy.

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21. A process for detecting and extracting fingerprints from digital data, comprising:

- determining embedding regions within the digital data;
- using a plurality of secret keys to perform watermark detection on
- 5 each of the embedding regions; and
- detecting identification information associated with a secret key.

22. The process as set forth in claim 21, further comprising computing multiple hash values of the digital data and determining the embedding regions

10 using the multiple hash values.

23. The process as set forth in claim 21, further comprising extracting collaborator information from the identification information.

15 24. The process as set forth in claim 23, further comprising constructing a list of collaborators from the collaborator information representing a list of persons who collaborated in producing the digital data.

20 25. One or more computer-readable media having computer-readable instructions thereon which, when executed by one or more processors, cause the one or more processors to implement the method of claim 21.

25 26. A desynchronized fingerprinting system for desynchronized fingerprinting of copies of an original digital multimedia product, comprising:

- an embedding module for using a random desynchronization process and a plurality of secret keys to embedding fingerprints in each copy of the product; and
- a detection and extraction module for detecting the embedded fingerprints using the plurality of secret keys and extracting collaborator
- 30 information from the fingerprints to identify collaborators in the production of an illegal copy of the digital multimedia product.

27. The desynchronized fingerprinting system as set forth in claim 26,
wherein the embedding module further comprises an embedding region selector
for randomly selecting embedding regions in each copy of the product in which to
5 embed fingerprints.

28. The desynchronized fingerprinting system as set forth in claim 26,
wherein the embedding module further comprises a desynchronization region
selector for randomly selecting desynchronization regions in which to apply
10 intentional desynchronization.

29. The desynchronized fingerprinting system as set forth in claim 28,
wherein the embedding module further comprises a random desynchronization
module for randomly selecting and applying a width of the desynchronization
15 regions such that each width of a desynchronization region is different between
each copy of the product.